Summary of Current Effluent Limitations and Monitoring Requirements (a)

CHEMICAL MONITORING

Effluent Characteristic	Discharge Limitation: Daily Maximum (ug/L)	Discharge Limitation: Monthly Average (ug/L)	Monitoring Requirements: Measurement Frequency	Monitoring Requirements: Sample Type	Monitoring Requirements: Reported Value(s)
Total of 16 Polynuclear Aromatic Hydrocarbons (PAHs)	20	--	Once per week	24-hour composite (c)	Maximum daily
Individual PAHs (b)					
Naphthalene	4	--	Once per week	24-hour composite	Maximum daily
Acenaphthylene	4	--	Once per week	24-hour composite	Maximum daily
Acenaphthene	4	--	Once per week	24-hour composite	Maximum daily
Fluorene	2	--	Once per week	24-hour composite	Maximum daily
Phenanthrene	2	--	Once per week	24-hour composite	Maximum daily
Anthracene	2	--	Once per week	24-hour composite	Maximum daily
Fluoranthene	2	--	Once per week	24-hour composite	Maximum daily
Pyrene	2	--	Once per week	24-hour composite	Maximum daily
Benzo(a)anthracene	2	--	Once per week	24-hour composite	Maximum daily
Chrysene	2	--	Once per week	24-hour composite	Maximum daily
Benzo(b)fluoranthene	2	--	Once per week	24-hour composite	Maximum daily
Benzo(k)fluoranthene	2	--	Once per week	24-hour composite	Maximum daily
Benzo(a)pyrene	2	--	Once per week	24-hour composite	Maximum daily
Dibenzo(a,h)anthracene	2	--	Once per week	24-hour composite	Maximum daily
Benzo(g,h,i)perylene	2	--	Once per week	24-hour composite	Maximum daily
Indeno(1,2,3-cd)pyrene	2	--	Once per week	24-hour composite	Maximum daily
Pentachlorophenol (d)	6	--	Once per week	24-hour composite	Maximum daily
Discharge Flow (gpm) (e)	NA	--	Continuous	Recording	Maximum daily
Total Suspended Solids [TSS] (mg/L)	NA	--	Once per week	24-hour composite	Maximum daily
Total Dissolved Solids [TDS] (mg/L)	NA	--	Once per week	Grab	Maximum daily
Temperature [degrees C]	NA	--	Once per week	Grab	Maximum daily
Dissolved Oxygen [DO] (mg/L)	NA	--	Once per week	Grab	Maximum daily
pH	6.0 - 9.0	--	Once per week	Grab	Maximum daily
Metals (f)					
Zinc	95	47	Once per week	24-hour composite	Maximum daily
Lead	140	70	Once per week	24-hour composite	Maximum daily
Mercury	2.1	1	Once per week	24-hour composite	Maximum daily
Nickel	75	37	Once per week	24-hour composite	Maximum daily
Cadmium	43	21	Once per week	24-hour composite	Maximum daily
Chromium (Total)	1100	548	Once per week	24-hour composite	Maximum daily

BIOMONITORING (g)

Organism	Type of Toxicity Test	Monitoring Requirements: Measurement Frequency	Monitoring Requirements: Sample Type	Monitoring Requirements: Reported Value(s)
Inland Silversides (Menidia beryllina)	Acute survival test	Quarterly	24-hour composite	LC50
Purple sea urchin or sand dollar (h)	Chronic test	Quarterly	24-hour composite	IC25
Pacific oyster or mussel larvae (h)	Chronic test	Quarterly	24-hour composite	NOEC, LOEC, EC50/LC50

Notes:

(a) Modified from EPA's Administrative Order for Necessary Interim Response Actions No. 1091-06-03-106 dated June 17, 1991.

(b) Each of the 16 priority pollutants PAHs are quantified separately using EPA Method 8310 from Test Methods for Evaluating Solid Waste, Third Edition, SW-846. The 16 individual PAHs are summed to arrive at the total PAH value.

(c) A 24 hour composite sample is collected using an automatic sampler.

(d) Pentachlorophenol is quantified using EPA Method 8040 from Test Methods for Evaluating Solid Waste, Third Edition, SW-846.

(e) Flow is measured by a continuous flow meter.

(f) Metals are quantified using EPA Contract Laboratory Program (CLP) analytical methods and QA/QC, however full documentation is not required. Documentation only includes calibration, blank, accuracy, and precision results.

(g) Specific requirements for analytical methods, QA/QC , and reporting are provided in the attached fact sheet.

(h) These organisms may be used interchangeably if required.

Reference: Interim ROD
Wyckoff Groundwater Operable Unit
Wyckoff/Eagle Harbor Superfund Site
September 30, 1994

Current Biomonitoring Requirements

I. Acute Toxicity Test Requirements:

1. For each test period (see also Paragraph I.8 below), acute survival toxicity tests are required for Inland Silversides (*Menidia beryllina*).

2. The test protocol is adapted from C.I. Weber, et al, *Methods for Measuring the Acute Toxicity of Effluents to Freshwater and Marine Organisms*. EPA/600/4-90/027, 1991.

3. All quality assurance criteria used are in accordance with *Methods for Measuring the Acute Toxicity of Effluents to Freshwater and Marine Organisms*, EPA/600/4-90/027. Test results which are not valid (e.g.. control mortality exceeds acceptable level) will not be accepted and must be repeated.

4. The test is performed with a series of dilutions (100, 50, 25, 12.5, and 6.25 percent effluent) plus a control (0 percent effluent) to determine (1) the LC_{50}, and (2) any statistically significant differences between the results for the control and each effluent concentration tested.

5. If the test demonstrates the presence of acute toxicity, EPA will undertake the following actions as needed to determine the source of toxicity:

   (a) Chemical analyses.

   (b) Evaluation of treatment processes and chemicals used.

   (c) Physical inspection of facility for proper operation of treatment units, spills, etc.

   (d) Examination of records.

   (e) Interviews with plant personnel to determine if toxicant releases occurred through spills, unusual operating conditions, etc.

   If any toxicity remains after conducting the above steps, additional monitoring or treatment may be required.

6. A written report of the toxicity test results and any related source investigation are prepared for EPA within 60 days after the initial sampling. The report of the toxicity test results and chemical analyses shall be prepared in accordance with the Reporting Sections in the documents specified above in Section I-3.

7. Chemical testing for the parameters for which effluent limitations exist shall be performed on a split of each sample collected for bioassay testing. To the extent that the timing of sample collection coincides with that of the sampling required for the effluent limitations, analysis of the split sample will fulfill the requirements of that monitoring as well.

8. Testing shall be conducted every three months (4 times per year), until EPA modifies this requirement in writing. Additional toxicity testing is also required at any time that spills or other unusual events result in different or substantially increased discharge of pollutants.

II. Chronic Toxicity Test Requirements:

1. For each test period (see also Paragraph II.11 below), chronic toxicity tests are required for the following organisms:

   (a) *Stronglyocentrotus purpuratus* (purple sea urchin), or *Dendraster excentricus* (sand dollar).

   (b) *Mytilus edulis* (mussel) or *Crassostrea gigas* (Pacific oyster) larvae.

   The purple sea urchin and sand dollar, and the mussel and Pacific oyster may be used interchangeably if necessary.

2. In each year, the bioassay tests shall be conducted four times with each organism during the organism's natural spawning period. To the extent that these seasons overlap, testing shall be conducted on splits of the same effluent samples. Any tests which fail the criteria for control mortality as specified in the respective protocols shall be repeated on a freshly collected sample

3. Testing is conducted on 24-hour composite samples of effluent. Each composite sample collected shall be large enough to provide enough effluent to conduct toxicity tests, as well as chemical tests required in Part II.10. below.

4. The chronic toxicity tests are performed as follows:

(a) For the purple sea urchin/sand dollar, tests are performed on a series of dilutions, plus a control (0 percent effluent). The IC_{25} value (the incipient concentration of effluent causing a 25 percent reduction in biological measurement, e.g., fertilization, is calculated. EPA has indicated that the IC_{25} is the approximate analogue to the no observable effect concentration (NOEC) of the effluent in the control water. The NOEC is that concentration of effluent for which survival, reproduction, or growth of the test organisms is not significantly different (at the 95% confidence level) from that of the control organisms (see *Technical Support Document for Water Quality-based Toxics Control,* EPA/505/2-90-001, March 1991).

(b) For the mussel or Pacific oyster larvae, tests are performed on a series of dilutions, plus a control (0 percent effluent). The NOEC, LOEC (lowest observable effect concentration), and the EC50/LC50 (effective concentration [EC] at which 50 percent of the population shows sublethal effects such as reduction in growth and lethal concentration [LC] at which 50 percent of the population dies, respectively), are calculated.

5. The chronic bioassays are conducted in accordance with the following protocols:

(a) For purple sea urchin/sand dollar: *Short-term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Marine and Estuarine Organisms*, EPA/600/4-87/028 and The Environmental Monitoring and Support Laboratory, Cincinnati, OH, 1988

(b) For mussel/Pacific oyster larvae: *Standard Guide for Conducting Static Acute Toxicity Tests Starting with Embryos of Saltwater Bivalve Molluscs,* ASTM E 724-89.

6. All quality assurance criteria used shall be in accordance with *Methods for Measuring the Acute Toxicity of Effluents to Freshwater and Marine Organisms,* EPA/600/4-85-013, *Quality Assurance Guidelines for Biological Testing,* EPA/600/4-78-043, and for oyster/mussel larvae test, *Standard Guide for Conducting Static Acute Toxicity Tests Starting with Embryos of Saltwater Bivalve Molluscs,* ASTM E 724-89. The control water shall be high quality natural seawater. No exceptions will be made for artificial sea salts or concentrated brine unless Wyckoff submits data to EPA which demonstrates that the lab has reliably conducted the specified test with one of these media.

7. The results of the bioassay tests are provided to EPA within 45 days after completion of each test in accordance with the Reporting Section in *Short Term Methods for Estimating Chronic Toxicity Effluents and Receiving Water to Marine and Estuarine Organisms,* EPA/600/4-87/028, May 1988, and include any other information required by the protocols.

8. EPA and Ecology will evaluate the results to determine whether they indicate the occurrence of chronic toxicity outside the mixing zone. If it appears that this may be occurring, a toxicity evaluation and reduction plan will be prepared within 90 days. The evaluation portion of the plan may include additional toxicity testing if needed to follow up on initial results or gather information for a possible toxicity limit in the future.

9. If the sea urchin/sand dollar or mussel/oyster larvae tests prove inadequate for evaluating Wyckoff's effluent, EPA may substitute alternative tests which will provide the required toxicity information.

10. Chemical testing for the parameters for which effluent limitations exist shall be performed on a split of each sample collected for bioassay testing. To the extent that the timing of sample collection coincides with that of the sampling required for the effluent limitations, analysis of split sample will fulfill the requirements of that monitoring as well.

11. After one year, EPA may reduce the monitoring requirements to once per year, using the more sensitive species. All modifications will be approved by EPA in writing.

Modifications to the Current Effluent Limitations
Wyckoff Thermal Remediation
Pilot Study Treatment System[1]

The following modifications will be made to the Chemical and/or Biomonitoring requirements:

1. Remove metals (zinc, lead, mercury, nickel, cadmium, and chromium) as a monitoring requirement. Metals was not used during wood-preserving operations at the Wyckoff/Eagle Harbor site. Additionally, years of sampling never detected metals in the treatment plant effluent.

2. Temperature will be monitored. Ecology believes an effluent temperature discharge of 20°C (68°F) to 25°C (77°F) would not cause a water quality violation in receiving waters of Puget Sound. A mixing zone has been established at the point of discharge. Grab samples for temperature monitoring will be taken once per week.

3. Dissolved oxygen (DO) and turbidity will also be monitored by grab samples once per week. The daily maximum discharge limitations are:

   DO: Shall exceed 6 mg/L
   (the receiving waters of Puget Sound off Wyckoff are considered to be Class A Marine Water)

   Turbidity: If background is $<$ 50 ntu, discharge cannot exceed background plus 5 ntu
   If background is $>$ 50 ntu, discharge cannot exceed a 10% increase

4. The following Measurement Frequency will be employed during the first three months of pilot study operation:

   - Daily effluent sampling for weeks 0 to 2
   - Twice a week for week 2 to month 3
   - Biomonitoring at month 3

   Based on the results of the sampling data, the Measurement Frequency will be adjusted as appropriate after month 3. Any sampling adjustments made shall be no less than once per week for effluent chemical monitoring and quarterly for biomonitoring, for the remainder of the pilot study.

The above modifications will be employed during the thermal pilot study. Effluent Limitations will be developed/adjusted for the full-scale treatment system based on the results of the pilot study, as appropriate.

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[1] Per agreement by the EPA Project Manager, Hanh Gold, and the Ecology Project Managers, Guy Barrett and Marian Abbett on February 2, 2000, and during subsequent communications on February 8 and 10, 2000.